

CovidGAN: Data Augmentation Using Auxiliary Classifier GAN for Improved Covid-19 Detection

Year: 2020 | Citations: 619 | Authors: Abdul Waheed, Muskan Goyal, Deepak Gupta, Ashish Khanna, F. Al-turjman

Abstract

Coronavirus (COVID-19) is a viral disease caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The spread of COVID-19 seems to have a detrimental effect on the global economy and health. A positive chest X-ray of infected patients is a crucial step in the battle against COVID-19. Early results suggest that abnormalities exist in chest X-rays of patients suggestive of COVID-19. This has led to the introduction of a variety of deep learning systems and studies have shown that the accuracy of COVID-19 patient detection through the use of chest X-rays is strongly optimistic. Deep learning networks like convolutional neural networks (CNNs) need a substantial amount of training data. Because the outbreak is recent, it is difficult to gather a significant number of radiographic images in such a short time. Therefore, in this research, we present a method to generate synthetic chest X-ray (CXR) images by developing an Auxiliary Classifier Generative Adversarial Network (ACGAN) based model called CovidGAN. In addition, we demonstrate that the synthetic images produced from CovidGAN can be utilized to enhance the performance of CNN for COVID-19 detection. Classification using CNN alone yielded 85% accuracy. By adding synthetic images produced by CovidGAN, the accuracy increased to 95%. We hope this method will speed up COVID-19 detection and lead to more robust systems of radiology.